GEARING TOWARDS A GREENER FUTURE

Edited by:
Amir Azam Khan
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Paper No.
02-2017

COLLABORATIVE LOCATION-BASED MOBILE GAME WITH ERROR DETECTION ALGORITHM

[1]Adrus Mohamad Tazuddin, [2]Wong Ming Ming and [3]Abang Mohamad Aizuddin

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3) Faculty of Engineering, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia, (e-mail: amaizuddin@unimas.my).

Abstract

In the recent years, there has been an evolution in game input medium. From just using buttons, players can now interact with games through a wider spectrum of inputs which includes touch screen, camera, light sensor, accelerometer, compass and GPS. This is driven by the availability of these modules and sensors within mobile devices that are omnipresent nowadays. As a result, there has been a creative breakthrough on how games are played today where gaming experience can be made more intuitive and immersive. Localization is one of the input medium where the player's physical location is used as part of the gameplay. This paper proposes an original gameplay schema that utilizes indoor mobile Wi-Fi localization technique as game input that does not require additional infrastructure. The game takes advantage of the weakness of Wi-Fi localization where environmental influence is significant and make it part of the gameplay. A simple error detection algorithm is also introduced to maximize the game playability value by balancing game responsiveness and accuracy level.

Keywords: technology, Wi-Fi localization, location-based games, pervasive games

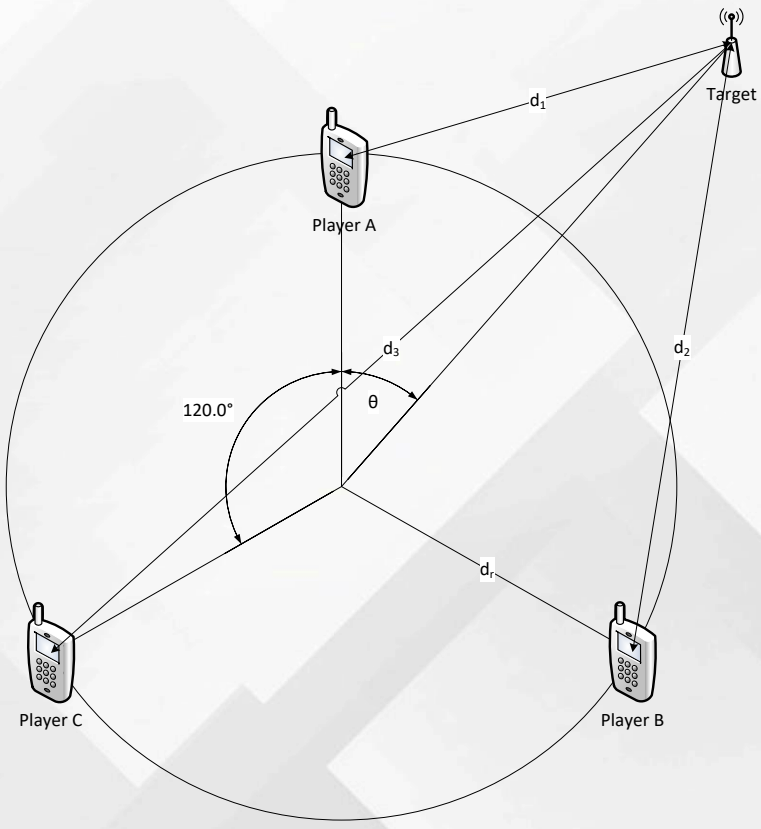

Fig. 1 Scanning for the opposing team's target.

**Corresponding author

Paper No.
04-2017

AN EMMS MIXTURE MODEL WITH BUBBLE SIZE DISTRIBUTION

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2) Department of Chemical Engineering and Energy Sustainability, Faculty of Engineering, Universiti Malaysia Sarawak (UNIMAS).

Abstract

Modeling of fluidized beds with special focus on mesoscale structures has become prominent area of research in recent years. These efforts have focused on incorporating the effects of bubbles and clusters on the bed hydrodynamics. To account for the effects of these mesoscale bubbles on hydrodynamics of gas fluidized beds, appropriate sub-grid models are required. Energy Minimization Multiscale Modeling (EMMS) is one of the promising approaches available to this end. Present work focuses on development of an EMMS modeling approach where a bubble size distribution has been considered. In this work, bubble based EMMS mixture model developed earlier by same team has been modified. To consider the distribution, user defined values of minimum (db,min) and maximum diameter (db,max) are specified. As a first test case, a uniform bubble size distribution was followed. Due to the distribution, drag force was considered to comprise of contribution from each size group. The mathematical form of the objective function describing the energy for suspension and transport has not been altered. The heterogeneity index (Hd) from this new drag modification is then used to simulate turbulent fluidized beds of Group A and B particles.

Keywords: EMMS, CFD, turbulent bed, fluidization, multiphase

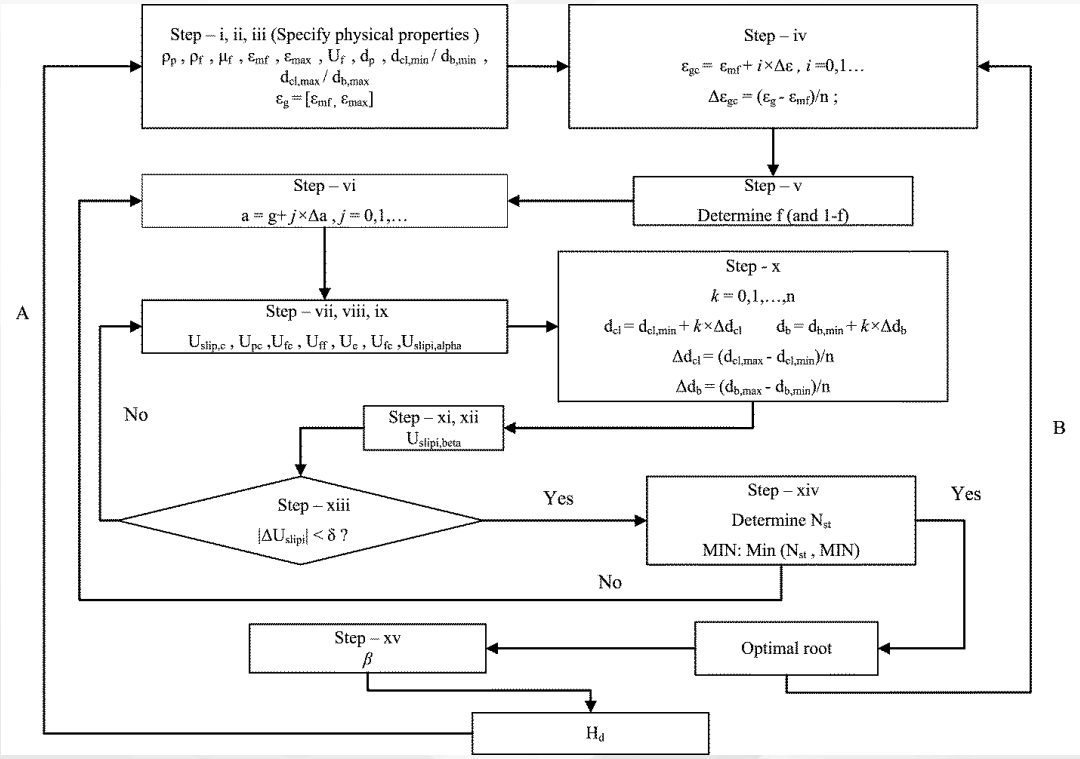

Fig. 2 Algorithm for calculation of heterogeneity index with EMMS mixture model.

**Corresponding author

Paper No.
05-2017

MANAGING DESIGN CHANGE DYNAMICS IN BUILDING CONSTRUCTION: CONCEPTUALIZING A QUALITATIVE MODEL

**[1]Jeffrey Yap Boon Hui, [2]Hamzah Abdul-Rahman and [3]Wang Chen

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2) Hamzah Abdul-Rahman. Professor, Faculty of Built Environment, University of Malaya, Kuala Lumpur, Malaysia.
3) Wang Chen, Distinguished Professor, College of Civil Engineering, Huaqiao University, Xiamen, China.

Abstract

Design changes are inevitable in building construction. The systemic effects of design changes are often under-estimated, triggering considerable overruns in project schedule and costs. To improve the understanding of the causal nature of design changes and its dynamic impacts on project performance, a causal loop model is conceptualized using system dynamics approach. The model facilitates project learning with the use of graphical representation of cause and effect feedback processes. The dynamic hypotheses indicate that effective communication improves design management and reusable project knowledge delimits design changes. Qualitative semi-structured interviews with twelve practitioners were conducted to gain insights on the causal relationship of the key variables. The conceptualized model is possibly the first ever model to correlate strategic management of design changes. This study addresses the current methodological gap in construction project management research that lacks system thinking and demonstrable causality with effective communication management and learning through past project experience and knowledge reuse for improved project delivery in the built environment.

Keywords: design change, overruns, communication, learning, system dynamics

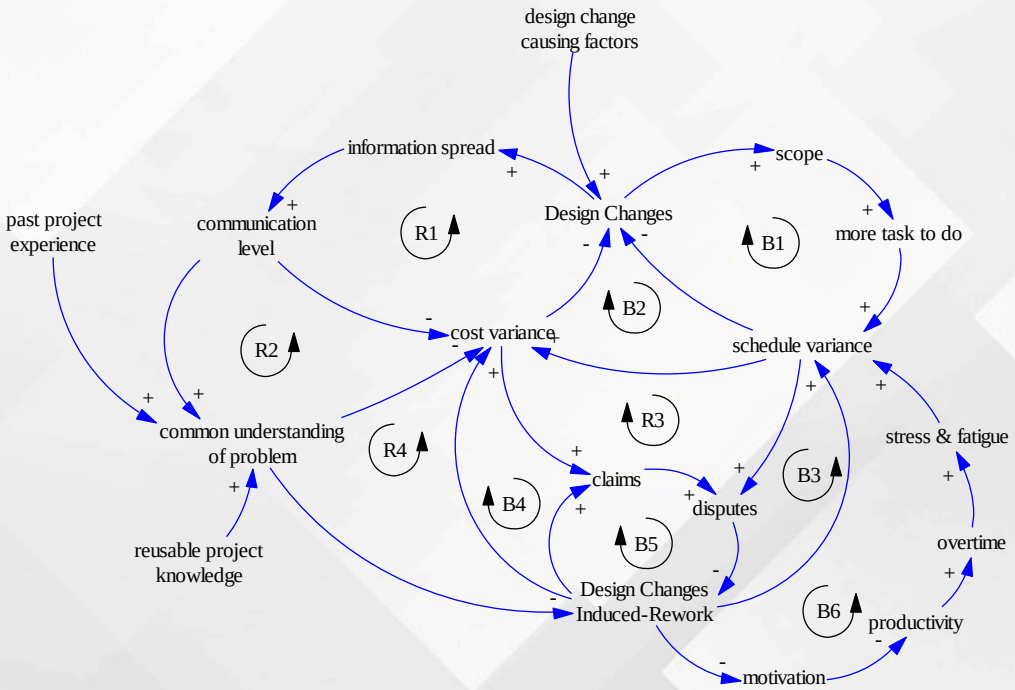

Fig. 3 Conceptual model of design changes based on causal modelling.

**Corresponding author

Paper No.
06-2017

GEOSPATIAL ASSESSMENT OF SOIL MOISTURE DISTRIBUTION IN CAMERON HIGHLANDSUSING GIS AND REMOTE SENSING TECHNIQUES

**Abdulkadir Taofeeq Sholagberu, Muhammad Raza Ul Mustafa, Khamaruzaman Wan Yusof and Ahmad Mustafa Hashim

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Abstract

Soil moisture is a significant unit of hydrological cycle that influences groundwater recharge and surface runoff. The expensive and laborious nature of ground-based measurement of soil moisture has called for application of remote sensing and geographic information system techniques. An investigation into soil moisture status is paramount to land degradation and desertification assessment. This study is therefore aimed at assessing the satellite derived LST-NDVI relationship for evaluation of geospatial distribution of soil moisture and evaluating its distributional pattern in mountainous Cameron Highlands watershed. Satellite sensors of Landsat-8 were used for estimation of soil moisture in ArcMap. The results of this study indicated that the mean land surface temperature (LST) for the area was estimated to be 23.30°C. Linear slope equations representing the maximum LST (dry edge) and minimum LST (wet edge) for LST-NDVI space scatter plot were evaluated for soil moisture index (SMI) estimation. The SMI values between -0.1484 and 0.3577 was observed with mean and standard deviation of 0.0965 and 0.0238 respectively. The results indicated that the highest mean SMI value occurred in the "very high" elevation class. This was because most high elevated areas are abundantly vegetated (high NDVI values) with relatively low level of human activities that exposes the land surface. This study explores multispectral satellite based soil moisture assessment for sustainable watershed management.

Keywords: Landsat-8, NDVI, LST, geospatial, elevation, SMI

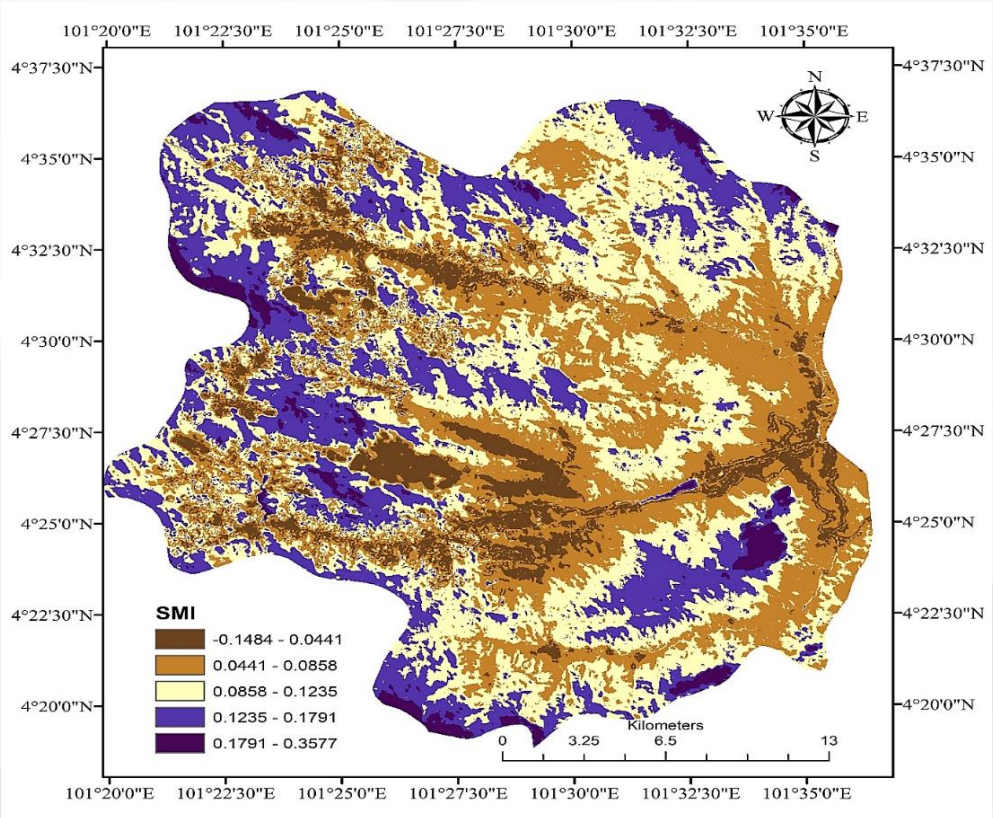

Fig. 4 Soil moisture index distribution map.

**Corresponding author

Paper No.
08-2017

PROBABILISTIC ECOTOXICOLOGICAL RISK ASSESSMENT OF IMIDAZOLIUM IONIC LIQUIDS WITH AMINO ACID AND HALIDE ANIONS

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Chemical Engineering Department, Universiti Teknologi Petronas,32610 Bander Seri Iskandar, Perak Darul Ridzuan, Malaysia (**Corresponding Author), phone: +60-5368-7588; (e-mail: dzulkarnain.zaini@utp.edu.my)

Abstract

Ionic liquids (ILs) are chemical substances with good solubility and low vapor pressure because they are ionized and therefore charged. ILs may harm ecosystem due to their good water solubility. Conventional toxicological studies focus on the evaluation of toxicity (EC50/LC50/IC50/LD50) of ILs for different species for individual ILs. At present, only the limited information is available about the impacts of ILs on the environment. It is difficult to assess the ecotoxicological risks of ILs because of unavailability of exposure data. The main objective of the current research is to use statistical methods using laboratory toxicity values (EC50) from literature to assess potential ecotoxicological risks when the ILs do come into industrial use. Probabilistic ecotoxicological risk assessment (PETRA) method was adopted by using species sensitivity distributions (SSDs) and chemical toxicity distributions (CTDs). Acute toxicity data were collected from literature data on the acute toxicity on four bacterial pathogens Aeromonas hydrophila, Escherichia coli, Listeria monocytogenes and Staphylococcus aureus. The SSD method was applied to estimate guideline values to give specified levels of protection for bacterial species. CTDs were calculated for each of the species to obtain the 1st and 5th percentiles to get screening point values (SPVs). SPVs were divided by assessment factors of 1000 recommended by Registration, Evaluation, Authorization & restriction of Chemicals (REACH) guidance to get screening-predicted no-effect concentrations (SPNECs). Imidazolium ILs with chloride and bromide anions were reported to be more risky towards bacteria selected in this research. Out of the four bacterial strains, E.coli was reported to be potentially at higher risk because of highest sensitivity when exposed towards ILs.

Keywords: ionic liquids; ecotoxicity; species sensitivity distributions, chemical toxicity distributions; probabilistic risk assessment

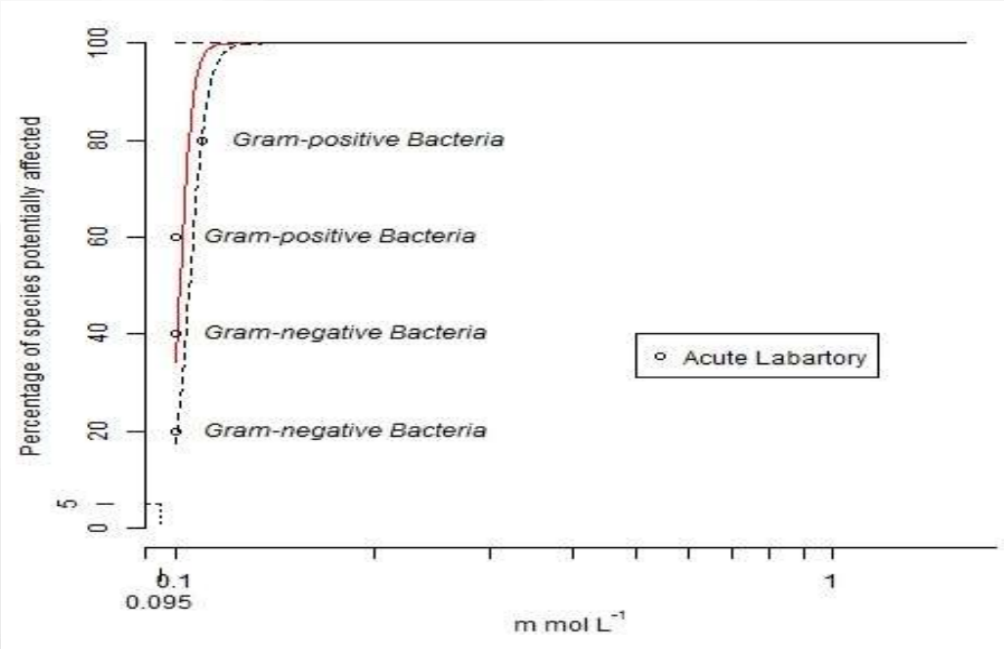

Fig. 5 SSD plot for Type-1 ILs.

**Corresponding author

Paper No.
11-2017

USE OF QUARRY DUST AS SAND REPLACEMENT IN STRUCTURAL CONCRETE: A REVIEW

**Lim Chung Han, Adriana Erica Amaludin, Hassanel Zazhary Amaludin, Mohd Azizul bin Ladin and Salinah binti Dullah

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Abstract

Concrete is one of the most widely used construction materials in the world today. As a result, sand, which makes up a large percentage of concrete, has been extensively mined and dredged, leading to environmental and sustainability issues. Many alternatives to sand have been investigated in the past, including quarry dust, which is a by-product from rock mining/quarrying industry and commonly regarded as waste. The environmental challenges associated with the safe disposal of quarry dust poses problems and much research has been carried out to investigate the feasibility of adapting quarry dust into the production of concrete as partial replacement in sand. This paper reviewed research work carried out in the past 20 years on replacement of sand with quarry dust in various types of structural concrete. Criteria assessed in this paper to determine feasibility of quarry dust as replacement include compressive, splitting tensile and flexural strengths, workability, and various durability properties. Quarry dust replacements from certain stones such as marble and granite can equal or surpass the mechanical properties of conventional concrete whilst other types required usage at optimum amount to achieve the same. Usage of quarry dust also comes at the expense of loss of workability, necessitating use of super-plasticizers.

Keywords: quarry dust, concrete, mortar.

Fig. 6 Quarry dust.

**Corresponding author

Paper No.
12-2017

EUCLIDEAN SPACE DATA PROJECTION CLASSIFIER WITH CARTESIAN GENETIC PROGRAMMING (CGP)

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2) Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

Abstract

Most evolutionary based classifiers are built based on generated rules sets that categorize the data into respective classes. This research work is a preliminary work which proposes an evolutionary based classifier using a simplified Cartesian Genetic Programming (CGP) evolutionary algorithm. Instead on using evolutionary generated rule sets, the CGP generates i) a reference coordinate ii) projection functions to project data into a new 3-Dimensional Euclidean space. Subsequently, a distance boundary function of the new projected data to the reference coordinates is applied to classify the data into their respective classes. The evolutionary algorithm is based on a simplified CGP Algorithm using a 1+4 evolutionary strategy. The data projection functions were evolved using CGP for 1000 generations before stopping to extract the best functions. The Classifier was tested using three PROBEN 1 benchmarking datasets which are the PIMA Indians diabetes dataset, Heart Disease dataset and Wisconsin Breast Cancer (WBC) Dataset based on 10 fold cross validation dataset partitioning. Testing results showed that data projection function generated competitive results classification rates: Cancer dataset (97.71%), PIMA Indians dataset (77.92%) and heart disease (85.86%).

Keywords: Cartesian Genetic Programming (CGP), evolutionary based classifier, clustering

Table 1 Results of training and testing.

Best/average training and testing rates (%)				
Dataset	***Best training***	***Best testing***	***Average Training***	***Average testing***
Cancer	*96.97*	*97.71*	*96.19*	*94.85*
Diabetes	*80.36*	*77.92*	*73.45*	*71.07*
Heart Disease	*77.53*	*85.86*	*76.56*	*80.21*

**Corresponding author

Paper No.
13-2017

ADDITION OF CEMENT LEFTOVER FROM THE HOLLOW OF THE SPUN PILE REINFORCEMENT AS AN ADDITIVE TO SELF COMPACTING CONCRETE

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3) Faculty of Civil and Environmental Engineering, Universiti Tun Hussein Onn Malaysia, Batu Pahat, Johor, Malaysia.

Abstract

Spun pile have been significantly used widely to construct foundation for most construction project and implemented by developed countries including Malaysia. Spun pile is a reinforced precast and pre-stressed concrete compacted in mould through spinning compaction. Through the spinning compaction produced cement leftover in the reinforcement hollow of the spun pile that could be added into concrete mixture as an additive. The cement leftover of the spun pile were utilized in partial percentage as an additive for cement respectively in range of 0, 10, 20 and 30% (equal percentages). The result compressive strength at 7 and 28 days curing are presented to investigate the properties of the self-compacting concrete added with the cement leftover of the spun pile and other properties investigated include physical properties of fresh concrete and water absorption. The higher compressive strength and lower water absorption of the concrete added with the cement leftover of spun pile compared to the controlled concrete has been obtained for this study.

Keywords: spun pile, cement leftover, additive, self compacting concrete

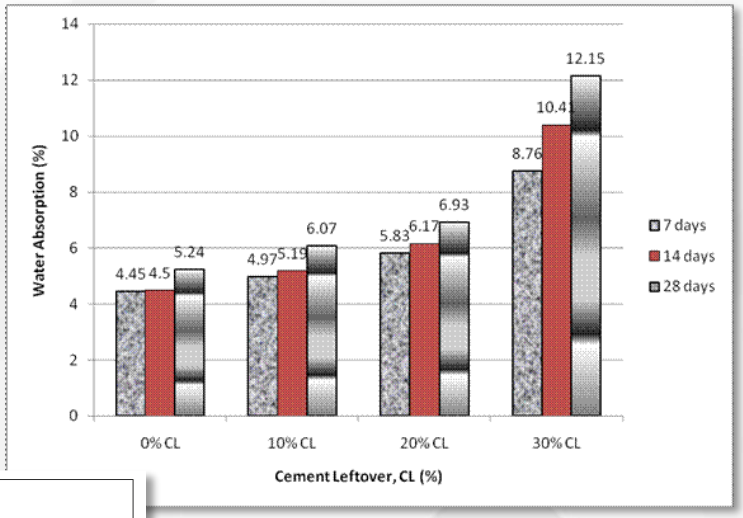

Fig. 7 Water absorption test result of each SCC batches at 7, 14 and 28 days of wet curing.

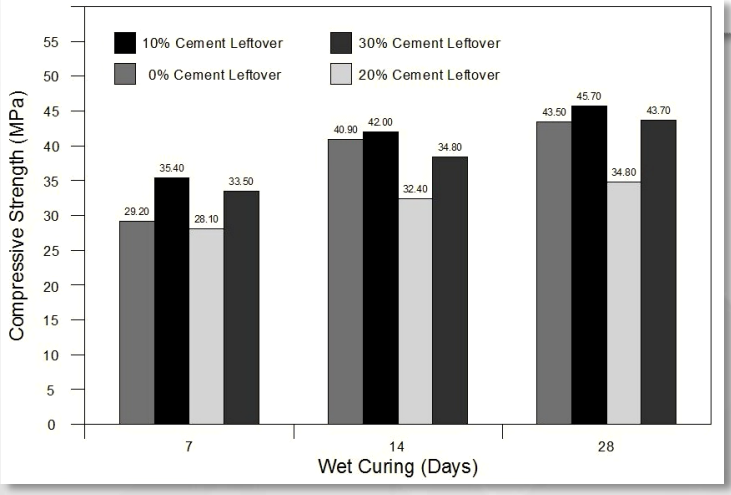

Fig. 8 Compressive strength test result of each SCC batches at 7, 14 and 28 days of wet curing.

**Corresponding author

Paper No.
15-2017

NUMERICAL ANALYSIS OF INITIAL CO2 BUBBLES LEAKED IN SHALLOW SEAWATER FROM OCEAN CO2 STORAGE USING VOLUME OF FLUID METHOD

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2) Chemical Engineering Department, Universiti Teknologi PETRONAS, Bandar Seri Iskandar and 32610, Perak, Malaysia.

Abstract

The aim of this article is to propose a model to predict initial size and shape of CO2 bubbles leaked in shallow seawater from ocean CO2 storage. The volume of fluid (VOF) model in FLUENT was employed. The initial bubble sizes were predicted to increase with the increases in leakage velocity and leakage orifice diameter. The leaked bubbles were predicted to form into various shapes. A comparison of bubble shape predicted by the VOF model and observed from the recently published experimental data showed a reasonable agreement. It was found that the VOF method can be a reliable approach for predicting the initial size and the shape which are used to calculate a rising velocity and a dissolution rate of the bubble during the occurrence of the CO2 leakage in the ocean.

Keywords: CO2 leakage, CO2 bubble, initial size, shape, VOF method.

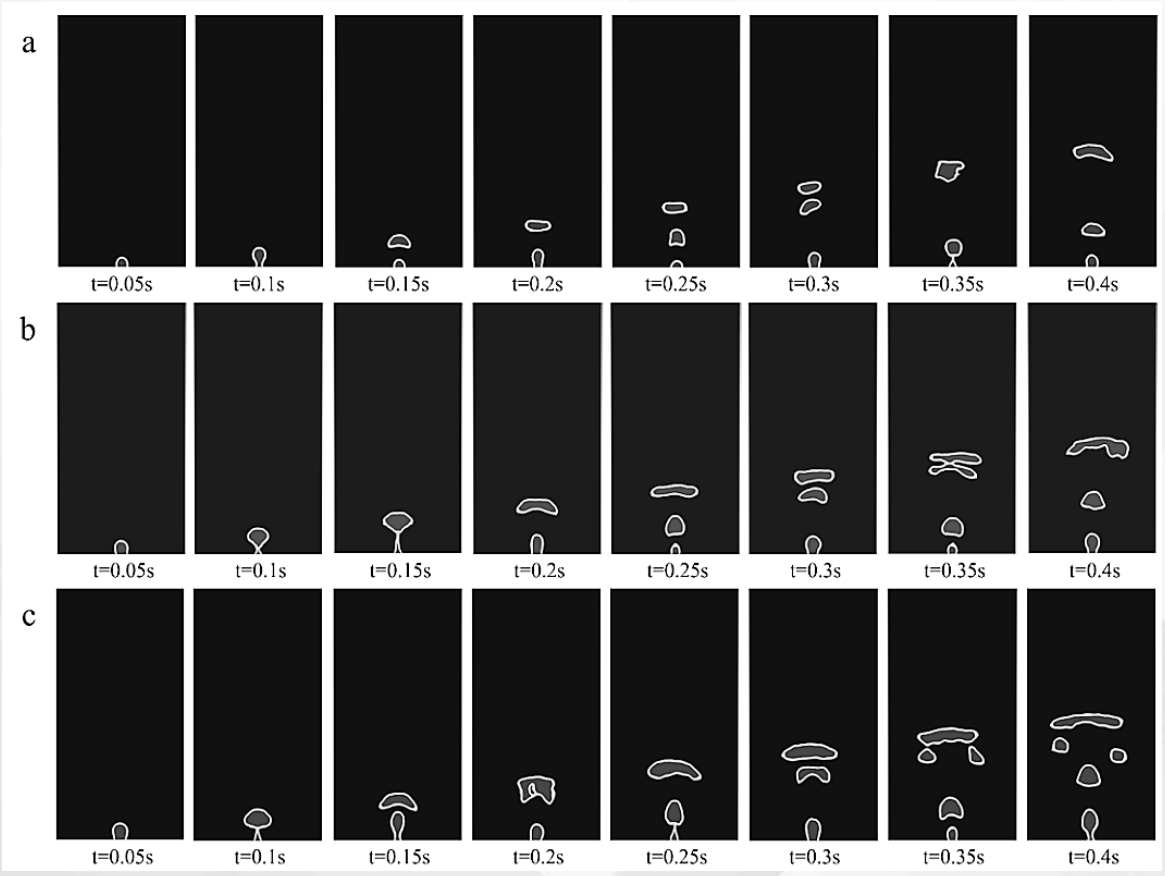

Fig. 9 Predictions of bubble formation after leaking through a leakage hole of 4-mm diameter and leakage velocity: (a) 0.15 m/s, (b) 0.25 m/s, and (c) 0.35 m/s.

**Corresponding author

Paper No.
18-2017

EFFECTS OF CATALYST BED POSITION ON HYDROGEN PRODUCTION BY METHANE DECOMPOSITION

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Abstract

COx free hydrogen can be produced by thermal decomposition of methane. Such process is carried out in a fixed bed catalytic reactor. Where heterogeneous catalytic reaction occur when methane come in contact with catalyst bed at a temperature range of 650-900ºC. In this work effects of different catalyst bed positions are investigated on the overall methane conversion to hydrogen. It is found that same catalyst has shown different results when placed at different heights in reactor column. Highest methane conversion of 85% c.a is found when catalyst bed is placed at 25% column height from bottom.

Keywords: hydrogen, methane decomposition, Fixed Bed Reactor, catalyst bed.

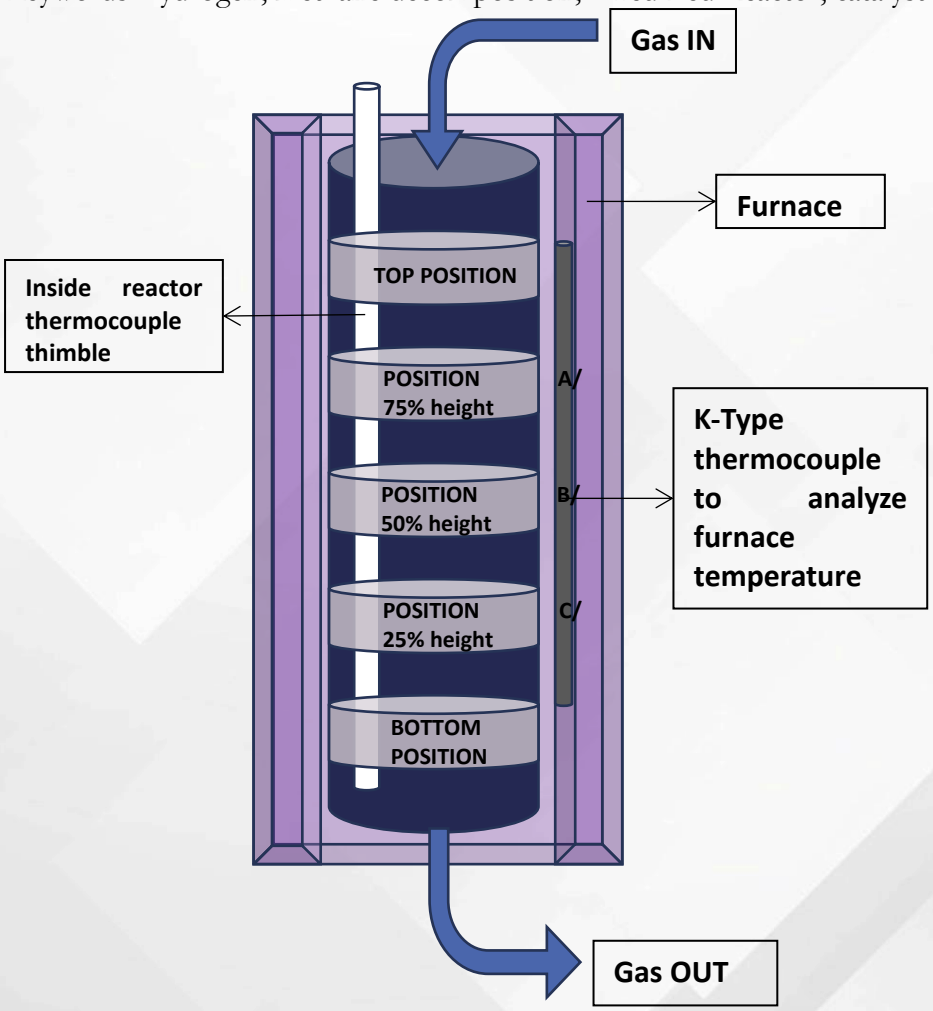

Fig. 10 Schematic diagram of a fixed bed reactor.

**Corresponding author

Paper No.
19-2017

MINIMUM IGNITION ENERGY OF ALUMINUM NANOPOWDERS AS ENGINEERED NANOMATERIALS (ENMS)

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Abstract

Enormous absence of knowledge regarding dust explosion involving Engineered Nanomaterials (ENMs) has led to the exploration on investigating the Minimum Ignition Energy (MIE) of selected ranges of sizes for aluminum nanopowders. Nano-structure owned by alumina definitely contributes to changes in its chemical as well as physical composition. Thus, testing on MIE determination was conducted on three different particle sizes of aluminum nanopowders; A1-100nm, Al-70nm, Al-40nm.The main aim of the project is to determine the relationship of the particle diameter with their respective MIE. The overall experimental procedure take place using 1.2L Hartmann tube explosion system based on ASTM E2019. Two different dust concentrations were tested (250 g/m3 and 500 g/m3) and the results showed that Al-40 nm have the lowest MIE values of less than 5mJ for both concentrations. For Al-70nm, the MIE value at concentration equals to 250g/m3 is between 10 mJ and 33 mJ, whereas the MIE is less than 10 mJ at concentration equals to 500 g/m3. This contradicts with Al-100nm in which the MIE is between 100 mJ and 200 mJ (c=250 g/m3) and between 33 mJ and 51 mJ (c=500 g/m3). In overall, as particle size decreasing, the MIE is significantly decreasing at respective concentrations.

Keywords: engineered nanomaterials, aluminum dust explosion, minimum ignition energy, nanopowders.

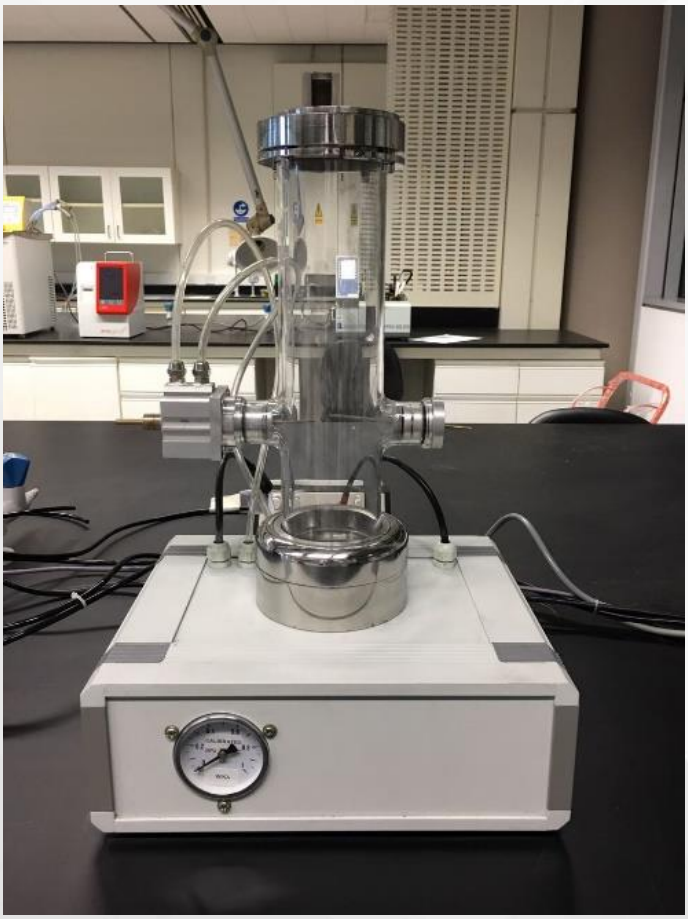

Fig. 11 MIE Cloud Apparatus.

**Corresponding author

Paper No.
20-2017

THE RELATIONSHIP OF SILVER CONTENT ON FLUX OF POLYSULFONE COMPOSITE MEMBRANE

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Abstract

Nanosilver has become one of the most popular nanoparticles due to its many applications and relatively low manufacturing costs. The aim of this study is to investigate the effect of silver nitrate against water flux made of two polymers which are polysulfone (PSF) and polyethyleneimine (PEI). Polysulfone (PSF) membranes were prepared by phase inversion method using N-methyl-2-pyrrolidone (NMP) as a solvent and water as a coagulant with different additional amounts (0.00-2.00 wt%) of silver contents. The membranes were characterized by scanning electron method (SEM), Fourier transform infrared spectroscopy (FTIR), and permeability test. The permeability test shows that membrane with 1.0 wt% of silver content gives the highest amount of water flux. This work explores the new configuration by embedding silver nitrate in composite membrane consist of PEI/PSF/Ag therefore encourage future work to find effective route to rational design of resulting in higher amount of water flux for better productivity.

Keywords: silver nanoparticles, polyethyleneimine (PEI), polysulfone (PSF), flux, NMP

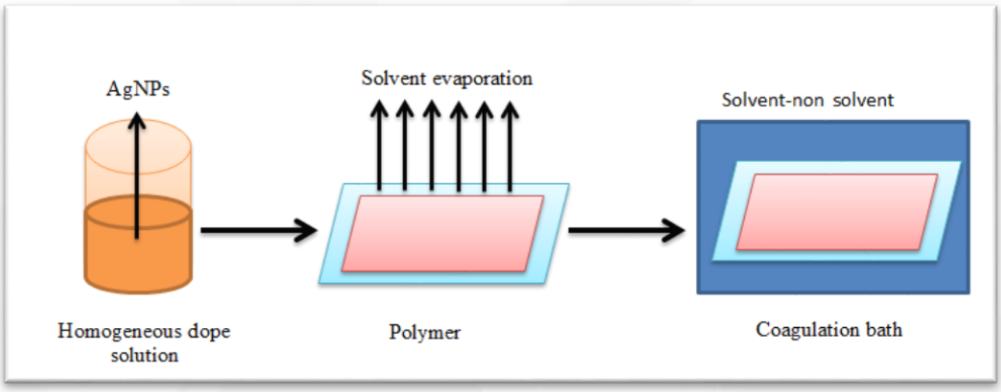
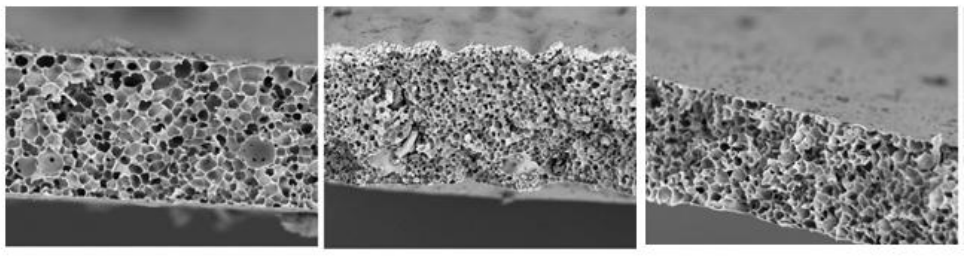
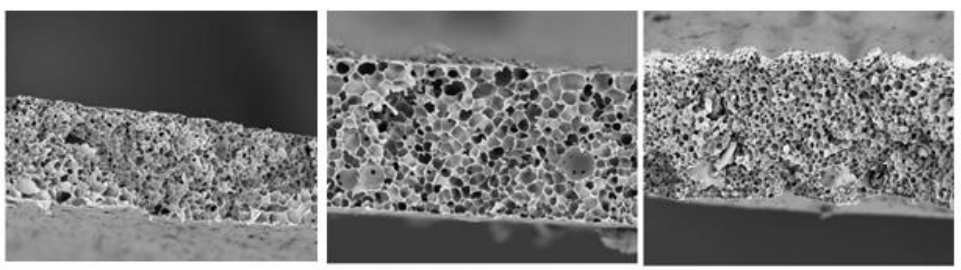


Fig. 12 Schematic illustration of membrane preparation.

Fig. 13
SEM Image for Cross Section Morphology (1500 magnification, 50 μm)
(a) pure PSU membrane,
(b) 0.5 wt % silver content
(c) 1.0 wt % silver content
(d) 1.5 wt % silver content
(e) 2.0 wt % silver content
(f) 0 wt% silver content



CM (a) CM (b) CM (c)



CM (d) CM (e) CM (f)

**Corresponding author

Paper No.
21-2017

MULTIPLE-OBJECTIVE OPTIMIZATION TECHNIQUES IN LASER JOINING OF DISSIMILAR MATERIALS CLASSES: A COMPARISON BETWEEN GREY AND RATIO ANALYSES

**[1]K. F. TAMRIN, [2]N. A. SHEIKH, [3]M. S. M. RIDZUAN and [1]A. N. NADIRAH

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2) Department of Mechanical Engineering, Faculty of Engineering, Capital University of Science and Technology, Islamabad, Pakistan.
3) Department of Electrical Engineering, Politeknik Kuching Sarawak, 93050 Kuching, Sarawak, Malaysia.

Abstract

Multiple-objective optimization using grey relational analysis (GRA) has found widespread applications especially in manufacturing and machining processes that involve complex processing parameters and output attributes. On the other hand, multiple-objective optimization on the basis of ratio analysis (MOORA) is often applied in the fields of construction and economy. One distinctive feature of MOORA is the assessment of relative importance of all responses (i.e. weighting ratio) which are taken into account mathematically whilst GRA emphasis the need of a priori information for accurate assignment of weighting ratio. This paper compares these two seemingly different methods by considering their applications in laser joining of dissimilar materials classes in a number of case studies: (a) laser joining of polymer and ceramic, (b) laser joining of polymer and stainless steel, and (c) laser joining of polymer and aluminium alloy. The outcomes of the two methods are compared and discussed. In majority of the cases, the predicted top-ranked alternatives were comparably matched. It is concluded that MOORA is more favorable compared to GRA since it eliminates prior assumption concerning the relative importance of the measured responses, which can lead to unnecessary bias.

Keywords: laser joining, dissimilar materials, MOORA, grey relational analysis

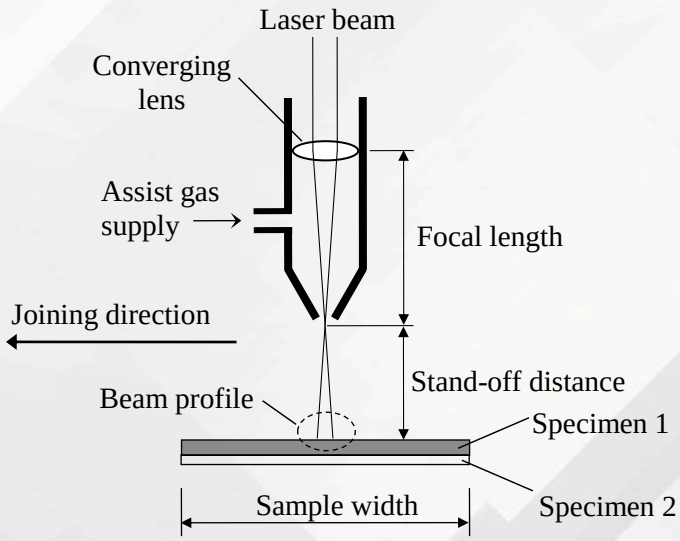

Fig. 14 A typical optical configuration used to perform laser joining process.

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